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FROM THE

STAGE COACH

TO THE

RAILROAD TRAIN

AND THE

STREET CAR

BY

GEORGE GLOVER CROCKER

1900

1656.57

FROM CASSIERS MAGAZINE APRIL 1900.

DESIGN BY ALBRECHT DURER
FOR EMPEROR MAXIMILIAN OF GERMANY
1459–1519.

THE HELIOTYPE PRINTING CO., BOSTON.

FROM THE STAGE COACH

TO THE

RAILROAD TRAIN AND THE STREET CAR.

AN OUTLINE REVIEW

WRITTEN WITH SPECIAL REFERENCE TO

PUBLIC CONVEYANCES

IN AND AROUND BOSTON IN THE NINETEENTH CENTURY

BY

GEORGE GLOVER CROCKER.

1900.

7656.87

A lawyer of Boston, Mass
Born 1843 -

7416

W. B. CLARKE CO.
PARK STREET CHURCH, BOSTON.

George G. Crocker,
Sept. 20, 1981.

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From the Stage Coach

TO THE

Railroad Train and the Street Car.

EIGHTEENTH CENTURY TIMES.

In the last, the eighteenth century, the footpaths around Boston were being developed into the horse trail, the cart track, the town way, and the rough country way. As a rule people travelled on foot and carried their packs on their backs,—the well-to-do rode on horseback, the man's saddle often being provided with a pillion or a rough side-saddle behind, on which a woman could ride. There were but few carts and still fewer carriages.

In 1768, one Pierre Eugene du Simitiere, who had been collecting statistics of a similar nature in other cities, found that in Boston there were twenty-two people who kept carriages of one sort or another.

So late as 1798, the total number of coaches, chairs, chaises and carriages of all kinds owned in Boston was one hundred and forty-five.

In those days at some seasons of the year the roads between the most important places were in such passable condition that the few who could afford it could ride in their own or in hired vehicles. On the main lines of travel post chaises, that is, two wheeled chaises with relays of horses every ten or twenty miles, could be obtained. The stagecoaches were the only regular public means of conveyance over land and of these stagecoaches there were very few.

In 1796 Daniel Webster came with his father from central New Hampshire to Phillips Academy, in Exeter, on horseback. In 1805 he went home from Boston to New Hampshire and hired a sleigh for the trip, because, as he writes, "Stages then no more ran into the centre of New Hampshire than they ran to Baffin's Bay."

Mr. C. W. Ernst has discovered and reports that in the year 1718 a stage line was established between Boston and Rhode

Island. This appears to be the first Boston stage line of which we have any record.

In 1751 a public vehicle which the owners called "a large stage chair" and which had seats for four passengers, began to run between the ferry landing in Charlestown and Portsmouth. It made the trip in two days. About ten years later Bartholomew Stavers started his famous stage line over the same route. The fare to Portsmouth was 13*s.* 6*d.*, and the stage ran once a week. It was called the "Portsmouth Flying Stagecoach," and its proprietor made a great point of his determination to run on time no matter what the weather or the condition of the roads. He advertised that he would put on six horses if necessary to get through on time. It must have been his name and energy which gave rise to the phrase "a regular staver." Stavers in his advertisement said that as this was a convenient and genteel way of travelling and greatly cheaper than hiring horses and carriages he hoped gentlemen and ladies would encourage the line.

About 1770 President Quincy of Harvard College wrote as follows of the stage journey between Boston and New York:

"The carriages were old, and the shackling and much of the harness made of ropes. One pair of horses carried us eighteen miles. We generally reached our resting place for the night, if no accident intervened, at ten o'clock and, after a frugal supper, went to bed, with a notice that we should be called at three next morning, which generally proved to be half past two, and then, whether it snowed or rained, the traveller must rise and make ready, by the help of a horn lantern and a farthing candle, and proceed on his way over bad roads, sometimes getting out to help the coachman lift the coach out of a quagmire or rut, . . . arriving at New York after a hard week's travelling, wondering at the ease, as well as the expedition, with which our journey was effected."

In 1775, when Washington came to take command of the American army, it took him twelve days to travel from Philadelphia to Cambridge.

The following advertisement appears in the *Massachusetts Centinel* of April 19, 1786:

"STAGE COACHES

"Gentlemen and Ladies who wish to take passage in the coaches running between Boston and Providence are informed that they are put in the best order possible for accommodating passengers. The distance, which is 45 miles, will be performed in 10 hours and for general convenience they will start from Providence after the 1st of May every Monday, Wednesday and

Friday. A coach will set out from Boston on the same days. The passage to New York by this route is frequently performed in three days. The price is 18*s.*; each passenger carrying 14 lbs. of baggage; all over must be paid for at the rate of 12*s.* per hundred. Those wanting passage will please apply to Mr. Ebenezer Hinkley, sign of Black & White Horse, No. 68 Newbury Street. SAMUEL BEASTO, ROBERT CURRIE, JAMES CURRIE, JOSEPH HOLMES, Owners."

No. 68 Newbury Street would be on the present Washington Street, near the corner of Kneeland Street.

In the same issue of the *Centinel* is an advertisement of fast packet boats from Providence and Newport to New York. The fare was 24*s.*; and provisions, not including liquor, 15*s.* more.

By this route, then, the total fare for a passenger with not more than fourteen pounds of baggage from Boston to New York, being by coach to Providence and then by sailing packet to New York, including provisions but no liquor, was fifty-seven shillings.

In 1795 there was no brick sidewalk in Boston, except near the Old South Meeting-House. Some of the principal streets were paved with pebbles and the people, except when they were driven to one side by carts or carriages, walked in the middle of the street because the pavement there was better.

NINETEENTH CENTURY. TURNPIKES.

At the beginning of the present century the importance of better roads had begun to be realized, but neither the state nor the towns had funds which the people were willing to appropriate for that purpose.

Levi Pease performed a great public service by coming to the front as the promoter of turnpike corporations. These were private corporations chartered by the Legislature with power to build roads between specified points and to collect tolls. A multitude of these turnpike corporations came into existence in the latter part of the last and the beginning of the present century. They radiated from Boston in straight lines to all the principal surrounding towns. Boston was indeed the hub, and they were the spokes.

There was a turnpike to Salem, to Newburyport, to Concord, to Worcester, to Dedham and Providence, to Neponset and Quincy. The Mill Dam, now Beacon Street, was opened as a toll road in 1821 and was so continued until 1868, when it was made free.

These turnpikes were better built and were kept in better repair than other roads, and so people were willing to pay toll for the privilege of using them. Almost without exception in this vicinity they were absolutely straight; they veered neither to the right nor to the left. When a hill was in the way they went straight over it. The charters of these turnpike corporations in defining the route generally required that the road should be built nearly straight or as straight as possible. In those days it was not realized that it is sometimes as far and almost always a great deal harder to go over a hill than around its base.

On the Salem turnpike a very small but peculiarly deep pond was encountered. The builders would not go around it and so they built a floating bridge over it. This bridge is still in use.

The collection of tolls on the turnpikes was generally discontinued in the "fifties," and the care of these roads was then undertaken by the towns and counties. In some cases this was pursuant to the original charters which provided that at the end of forty years the property should revert to the public and in other cases the owners voluntarily relinquished all their rights, being glad to get rid of an investment which had never been very profitable, and which at last became an actual burden.

STAGECOACH LINES.

During the first third of the present century these improved roads gave a great impetus to stagecoach travel. Stage lines rapidly increased in number and gave more frequent service.

The stagecoaches for long distance travelling had three inside seats, one at each end of the coach, and one in the middle called the strap seat. Each of these three seats accommodated three passengers, making nine in all inside. During the latter part of the period certainly there were also some outside seats. The back part of the coach was used for baggage. The Concord coach, which is now frequently seen in the country towns, is an improved example of the stagecoach of those days.

As there was great choice of seats on these coaches and as the accommodations were limited, it was the custom for people who intended to take a journey to go to the stage office several days in advance and secure their seats. This was called "booking." In conservative England, as a relic of stagecoach days, the ordinary ticket offices of the railroad stations are still called "booking offices."

As a rule the stages running to distant points left very early in the morning. The usual hour was 5 A. M., but there were several lines that started at 4 A. M., and some even at 2 A. M.

Josiah Quincy, writing in 1826 of a journey with Judge Story from Boston to Washington, says:

"The stage left Boston at 3 A. M., and at 2 A. M. a man was sent around to the houses of those who were booked for the passage. His instructions were to knock, pull the bell, and shout and disturb the neighborhood as much as possible, in order that the person who was to take the coach might be up and dressed when it reached his door. When the coach arrived there was no light inside and the passengers waited until daybreak before they could see who were their fellow passengers."

On this occasion Mr. Quincy and Judge Story travelled only in the day time, and reached New York on the fourth day in time for a late dinner. He adds: "It need not be said that we congratulated ourselves upon living in the days of rapid communications and looked with commiseration upon the conditions of our fathers, who were wont to consume a whole week in travelling between the cities."

Mr. Quincy and Judge Story made a remarkably quick trip from New York to Philadelphia, because there was an opposition coach behind them. They left New York at 5 A. M. and reached Philadelphia between 11 and 12 o'clock at night. They were three days in travelling from Philadelphia to Washington, so that they accomplished the whole distance from Boston to Washington in eight days.

In 1802 the schedule time from Boston to Groton was eleven hours up and fourteen hours down, an average of about three miles an hour.

From an examination of Badger & Porter's Stage Register, a publication giving information similar to that now given in our railroad guides, it appears that in the first third of this century stages on the main routes were scheduled to travel at the rate, including stops, of four or five miles an hour. Thus in 1832 it appears that the schedule time of the trip to New York, travelling night and day, was forty-one hours, or at the rate of a trifle over five miles an hour. This was under the influence of severe competition with steamboat lines, which were then running from Providence and from New Haven.

As the number of stage lines increased the fares were gradually reduced. In 1832 the fare from Boston to New York was $11.

Since there was active competition, this rate being about five cents a mile, was probably as low as any.

At the end of the first third of the present century the stage lines reached their highest development.

In 1832 there were ninety-three lines of stages running out of Boston. On some of these lines the coaches ran only twice or three times a week. The average number of stages leaving Boston each day for points more than six miles distant was sixty-three.

In those days the law prohibiting travelling upon Sunday, except from necessity or charity, a law which was not repealed until 1887, was sometimes enforced.

Josiah Quincy, in his "Figures of the Past," tells an interesting story in regard to the enforcement of this law in the town of Andover.

The good people of that town being very much disturbed by wicked violations of the law, determined to have it strictly enforced, and appointed a worthy deacon to see that the officers performed their duties. He accordingly denied himself the privilege of going to church, and stationed himself with the officers at a toll gate just outside of the town. A gentleman travelling in a carriage was stopped and told that he could go no farther. With great courtesy he said: "Gentlemen, I am fully aware of the provisions of law, and, of course, it is proper that you should enforce them, but you must remember that those people are excepted who travel from necessity or charity. Now, gentlemen, the fact is that my mother is lying dead in Boston and I ask that I may be permitted to pass." After consultation they decided that he was indeed within the exception, and they allowed him to pass. When he had reached a safe distance, he stopped and called back, "Don't forget to tell the good people of Andover that you permitted me to pass because my mother is lying dead in Boston, and you may add, also, if you please, that she has been lying dead there for some twenty years.

CANALS.

The stagecoach did not carry freight. The cost of freighting over poor roads between Boston and the interior of the state was practically prohibitive. Freight could be floated on water routes, but it could not profitably be carted to any great extent over land. The great water routes did not connect with Boston. The Merrimac River reached the ocean at Newburyport and the freight of the Connecticut crossing the middle of the state went to New York. New York also had the benefit of the still more important Hudson River. Our thoughtful citizens saw that

Boston would be left behind in the race unless some remedy was provided. The obvious thing to do was to build water routes terminating in Boston.

In 1792 a charter was granted for a canal from the Connecticut River to Boston. Under this charter no action was taken other than to make surveys.

In 1793 a charter was granted for a canal from the Merrimack to a junction with the Medford River. This Middlesex canal having been extended to the Charles River, was opened for traffic in 1803, and it continued in use for about fifty years, when it finally succumbed to railroad competition. Loammi Baldwin, the elder of that name, who was one of those named in the act of incorporation, superintended the work of construction. The canal was twenty-seven miles long, thirty feet wide and four feet deep, and the canal boats were built to carry twenty-four tons. They travelled at the rate of a little more than two miles per hour.

For many years after 1803, though the subject of building canals was much discussed, no further action was taken.

In 1825 the Erie Canal was opened in the state of New York and greatly added to the superior advantages which New York had previously enjoyed. The agitation in regard to the importance of improved means of intercourse with the interior of our state was thereby revived with great intensity, and the Legislature appointed a committee to consider the feasibility of a canal, not simply to connect Boston with the Connecticut, but a canal to connect Boston with the Hudson River.

In the following year, 1826, the committee reported that it was feasible and advisable to build such a canal. Surveys and estimates by Loammi Baldwin, the younger, had been made along two routes, one of which nearly coincided with the line of the present Boston & Albany Railroad and the other with that of the Fitchburg Railroad. The committee recommended that the northern route be adopted and that the canal should not be carried by locks over the Hoosac Mountain, but by a tunnel through it. There were to be some four hundred locks between Boston and the Connecticut River and many more than that between the Connecticut River and the Hudson. The estimated cost of the canal was six million dollars, of which one million was the sum allowed for the tunnel through the Hoosac Mountain. The subsequent experience of the state in building a tunnel through that mountain leads to the conclusion that if the estimates of all portions of this canal were no more reliable than the

estimates of the cost of the tunnel, the canal would have cost sixty million instead of six millions of dollars.

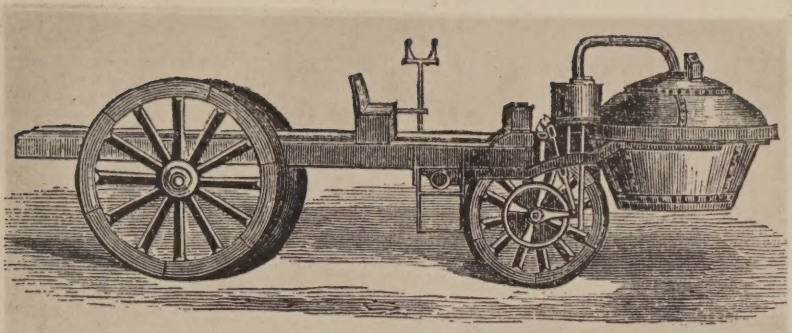
It is interesting to note as showing the standards of public morality of those days that the committee recommended that the funds should be raised by a lottery run by the state.

RAILROADS.

Opposition to the canal project had, at the time when this report was made, gained considerable strength. There were those in the community who believed that as a means of inland communication a railroad was better than a canal. For over a century and a half tramways had been in use in England in connection with the coal mines. These tramways at first consisted simply of wooden stringers furnishing a smooth, hard surface for the wagon wheels and having projections or flanges on each side to keep the wheels from running off. Next strips of iron were placed on these stringers to make them more durable, then these strips took more and more the shape of rails, and finally the flange to keep the wagon on the track was transferred from the stringers to the wheels. The railroad party called the attention of the public to the successful working of the English tramways, and it also, just at this time, received great encouragement and support from the successful enterprise of Mr. Gridley Bryant. In the spring of this same year, 1826, he obtained from the Legislature a charter to build a railroad from the granite quarries in Quincy down to the Neponset River, for the purpose of carrying to tide water the granite to be used in the construction of Bunker Hill Monument. There was much opposition to the granting of this charter, involving, as it did, the taking of a right of way by eminent domain, but the patriotic purpose for which the road was to be used finally carried the vote in its favor by a bare majority.

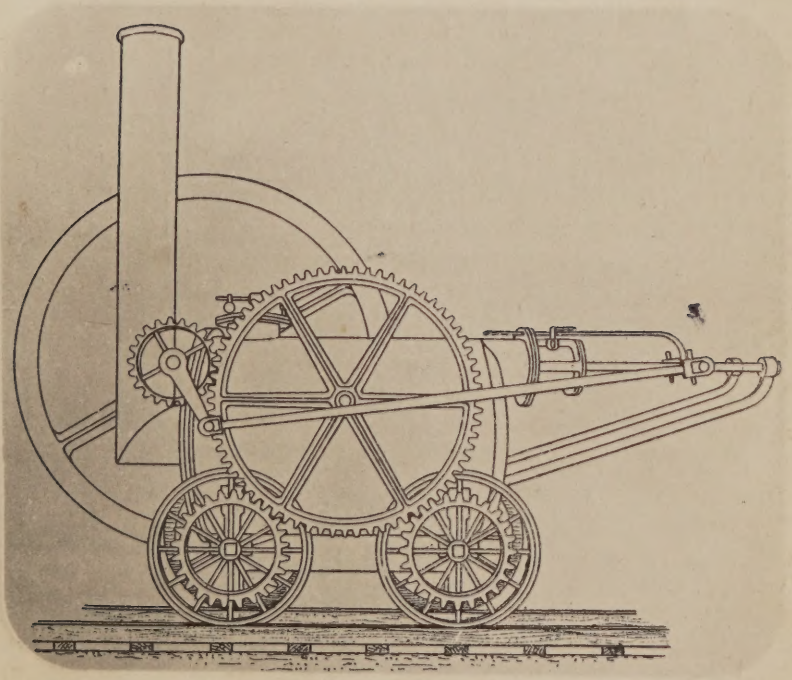
Mr. Bryant immediately went to work, in six months constructed his railroad, and on the seventh of October, in the same year, put it in operation.

While this was not the first railroad in America, having been preceded by the Phillipsburg & Juniata Railroad on the Alleghany Mountains, and by several other less important examples of roads constructed by laying strap rails on wooden stringers, it was built so substantially and attracted so much attention that



CUGNOT'S LOCOMOTIVE, 1769.

BOSTON PUBLIC LIBRARY



TREVITHICK LOCOMOTIVE.

it may be regarded as the germ from which the railroad in America has sprung.

In Pattee's History of Old Braintree and Quincy appears the following description of this railroad taken from the *Daily Advertiser:*

"This railroad, the first we believe in this country, was opened on Saturday, in the presence of a number of gentlemen, who take an interest in the experiment. A quantity of stone weighing sixteen tons, taken from the ledge belonging to the Bunker Hill Association and loaded in three wagons, which together weigh five tons, making a load of twenty-one tons, was moved with ease by a single horse from the quarries to the landing above Neponset Bridge, a distance of more than three miles. The road declines gradually the whole way, from the quarry to the landing, but so slightly that the horse conveys back the empty wagons, making a load of five tons. After the starting of the load, which required some exertion, the horse moved with ease in a fast walk. It may therefore be easily conceived how greatly the transportation of heavy loads is facilitated by means of this road. A large quantity of beautiful stone, already prepared for the Bunker Hill Monument, will now be rapidly and cheaply transported to the wharf at the termination of the railroad, whence it will be conveyed by lighters to Charlestown. The road is constructed in the most substantial manner. It rests on a foundation of stone laid so deep in the ground as to be beyond the reach of frost, and to secure the rails on which the carriage runs effectually against any change of their relative position, they are laid upon stones of eight feet in length, placed transversely along the whole extent of the road at a distance of six or eight feet from each other. The space between these stones is filled with smaller stones or earth, and over the whole, between the rails, a gravel path is made. The rails are formed of pine timber, on the top of which is placed a bar of iron. The carriages run upon the iron bars and are kept in place by a projection on the inner edge of the wheels. The wheels are of a size considerably larger than a common cart wheel."

The cost of this road is said to have been $34,000.

In 1827 a railroad was built from the coal mines in Mauch Chunk, in Pennsylvania, to the Lehigh River, a distance of nine miles. The cars descended by gravity and were dragged back by mules. The rails were of timber, laid on wooden sleepers, and strapped with flat iron bars.

In 1828 the Delaware & Hudson Canal Company constructed a railroad from its coal mines to Honesdale, the terminus of its canal, and the construction of the Baltimore & Ohio Railroad and the South Carolina Railroad was commenced in the same year.

In the followin 1829, Horatio Allen, chief engineer of the South Carolin ad, made a report to the directors of that company in fa perating by locomotive steam power, and the directors u ously adopted the report. The South Carolina Railroad was thus the first railroad which was authorized to be built expressly for locomotive steam power. The directors of the Liverpool & Manchester Railroad, in England, at that time had not determined what power should be used.

The charter of the Baltimore & Ohio Railroad was granted on the twenty-seventh of April, 1828, and construction was begun on July 4 with a great celebration. Charles Carroll of Carrollton, over ninety years of age, the only survivor of the signers of the Declaration of Independence, laid the corner stone, and declared it to be the second most important act of his life.

The road was opened from Baltimore to Ellicott's Mills on May 24, 1830, and was operated by horses. It was not completed to the Ohio River until 1852.

With a practical demonstration at Quincy of the advantages of a railroad its advocates in this state took new heart. The leader of their forces was Nathan Hale, the editor of the Boston *Advertiser*, who, on account of the controlling influence which he exerted, is sometimes called the father of the railroad system of the state.

Apparently the first report to the Legislature in favor of a railroad for passenger traffic was in 1827, when a committee reported that the railroad idea was feasible. This report contemplated a path for the horses on each side of the rails, like a canal tow path.

In 1829, after a lengthy and laborious investigation, a commission, composed of nine leading citizens, and known as the Board of Directors of Internal Improvements, reported to the Legislature in favor of the construction of a railroad to the Hudson River and also to Providence. The report is a most interesting document, and is accompanied by surveys and statistics furnished by James F. Baldwin and James Hayward, engineers, and by Solomon Willard, the architect of Bunker Hill Monument.

After describing the method of construction of the most approved colliery tramways in Great Britain, the board recommended that on account of the high cost of iron in this country and the abundance and cheapness of granite, the following form of construction should be adopted; namely, two parallel stone

walls, laid so deep as not to be moved by the effects of frost, surmounted by a rail of split granite of about a foot in thickness and depth, with a bar of iron placed on top of it of sufficient thickness to form the track. These stone walls were to be at the uniform distance of five feet from each other, as nearly horizontal as possible, and the space between them was to be filled to within six inches from the upper surface of the rail with earth and gravel, so as to form a path for the horses employed in drawing the carriages. The board reported that on the railroads recently built and then in process of construction in England and France, it was proposed to use locomotive engines, but the conclusion was reached that coal was so dear in this country and horses and fodder were so cheap, that horse power would be here more economical than steam power. It was stated that it was unnecessary to have the railroad absolutely level, as experience had shown that a steady exertion of strength by a horse is more fatiguing than even a greater exertion occasionally remitted. In a foot-note appears the following interesting suggestion:

"The labor of the horse may be still further relieved by providing a platform placed on small wheels, on the long descents, on which the horse himself may ride. This expedient, singular as it may seem to persons unaccustomed to observe the ease of locomotion on a railroad, is adopted with success on the Darlington & Mauch Chunk Railroad, and the horses eat their provender while they are returning to a point where their labor is to be resumed."

This same expedient is to-day employed with success on a tramway between Ontario and San Antonio, in California.

In 1830, the next year after the foregoing report, the Boston & Lowell Railroad Corporation was chartered. The Boston & Providence and the Boston & Worcester were chartered in 1831. The method of operation contemplated was similar to that of a turnpike, as appears from the following provision in relation to tolls which was inserted in each of the charters:

"That a toll be and hereby is granted and established, for the sole benefit of said corporation, upon all passengers and property of all descriptions which may be conveyed or transported upon said road, at such rates per mile as may be agreed upon and established from time to time by the directors of said corporation. The transportation of persons and property, the construction of wheels, the form of cars and carriages, the weight of loads, and all other matters and things in relation to the use of said road, shall be in conformity to such rules, regulations and provisions as the directors shall from time to time prescribe and direct, and

said road may be used by any persons who shall comply with such rules and regulations."

The idea was that any person could drive on this road his car or carriage, provided that it conformed to certain necessary regulations.

No reference was made to the motive power, but it is evident that horse power was contemplated.

THE STEAM LOCOMOTIVE.

The first steps in the development of the steam locomotive were taken in the attempt to construct steam carriages for use on the highways in England and France.

About two hundred years ago Sir Isaac Newton conceived the idea of an engine propelled by a steam vent in the rear, the principle being the same as that by which a rocket is shot up into the sky. He is credited with having prophesied that the day might come when men would travel at the rate of fifty miles an hour. Many years later Voltaire said that Newton was a fool to make such a prediction.

In 1769-1770, Nicolas Joseph Cugnot, a resident of France, built, at the expense of the king, a small high pressure engine, which ran on the common roads at the rate of three or four miles an hour, and is now preserved in the Museum of the Conservatoire des Arts et Metiers in Paris. Cugnot had previously, in 1763, made a model of a steam carriage, which was probably the first of which there is a written account.

The steam engine as developed in the first half of the eighteenth century by Newcomen, Cawley, Savery and others, was so far improved between 1765 and 1784 by Watt, Wasborough, Hornblower and Evans that it had become to some extent commercially available as the motive power for machinery.

In 1784, Watt patented a device for a steam carriage, and in the same year his assistant, James Murdock, constructed a working model of it, which was the first British working model of a steam carriage.

William Symington in 1786 made another working model, which is now preserved in the South Kensington Museum.

Five years prior to this, in 1781, Oliver Evans of Philadelphia, who is entitled to be called the American pioneer in steam locomotion on land, announced that he had discovered the application of steam as a motive power for land carriages. In 1784 he

applied to the Legislatures of Maryland and Pennsylvania for the exclusive right to make use of his discovery. The grant was made to him in Maryland, but was refused in Pennsylvania on the ground that it was absurd. In 1787 he sent abroad his plans and specifications for a steam road engine, but they were received with the same incredulity as in America. These plans called for a high pressure engine with a tubular boiler.

In 1803, at the order of the Philadelphia Board of Health, he built a steam dredger, which was a most remarkable contrivance. He built a scow at his works and set up an engine in it. Then he placed four small wheels under it and connected them with the engine, and so moved this odd craft a distance of one and a half miles to the Schuylkill River, where it was launched. A stern wheel for water navigation was next coupled on and the boat was successfully propelled through the water.

In 1796, Richard Trevithick, a foreman in a Cornish tin mine, who had had access to the plans of Oliver Evans, which were undoubtedly of great value to him in his experiments, made a working model of a steam locomotive. He made another in 1798, which is still preserved in the South Kensington Museum, London. On Christmas eve, 1801, he completed a genuine steam carriage, and on the same evening conveyed on a short trial trip the first load of passengers ever moved by the force of steam. His engine was called by the natives the "Puffing Devil" and "Captain Dick's Puffer." On this he obtained a patent in March, 1802. Early in 1803 his second steam carriage was built and exhibited in London, where it made several successful trips. The trials were brought to an end by the twisting of the frame. The engine was then removed from the carriage and set up in a mill.

All these devices were for use on the common roads.

In 1804, Richard Trevithick, then engineer of the Pen-y-darran Iron Works, near Merthyr Tydvil, completed another engine, the first to be tried on a tram road, where it carried ten tons of iron, seventy men and five wagons a distance of nine and one-half miles at the rate of nearly five miles an hour. On the second of March, in the same year, Trevithick wrote: "We have tried the carriage with twenty-five tons of iron and found we were more than a match for that weight. . . . The steam is delivered into the chimney above the damper, which makes the draft much stronger by going up the chimney." Shortly afterwards the locomotive jumped the track, and, like its predecessor, was converted

into a stationary engine. At the head of the list of great inventors who have had to do with the evolution of the modern locomotive stands therefore the name of Richard Trevithick. He was the first to construct a steam carriage which actually carried passengers on the highway. He was also the first to construct a steam locomotive which actually dragged cars with passengers and freight on a tramway. He first demonstrated the tractive power of a smooth wheel on a smooth track, he discovered the principle of the steam draft, and his locomotive is believed to have been the first example of a return-flue boiler.

Trevithick's discovery of the principle of the steam draft extended only to the discharge of the waste steam into the bottom of the chimney. Subsequently George Stephenson and Hackworth, a foreman of Stephenson's on the Stockton and Darlington Railway, increased the draft by directing the steam upwards and by discharging it through a contracted orifice to give it greater velocity. The full benefit of these expedients was not secured until after the building of the Rocket.

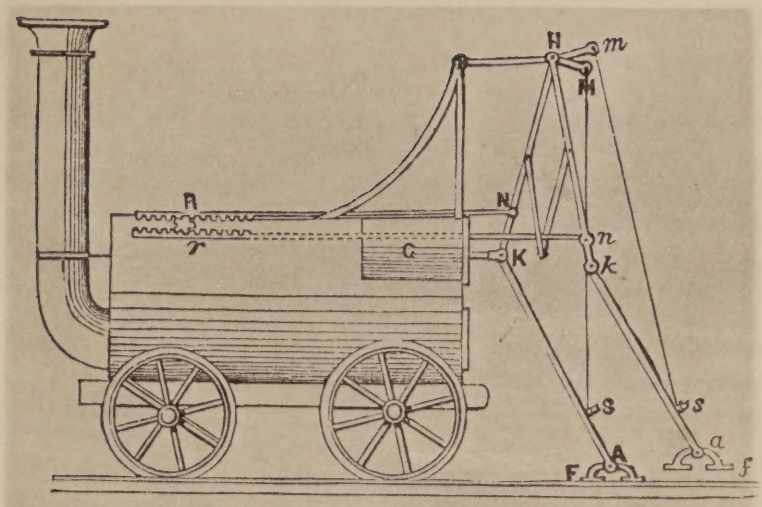
In 1812, Mr. Blenkinsop of Leeds, England, operated an engine with cog wheels working on a rack rail, on a railroad from the Middleton colliery to Leeds. Several of these engines were constructed, and for some years drew loaded coal wagons to and from the mines at a speed of about three miles an hour. It seems that this was the first example of the employment of steam locomotive power for commercial purposes.

In 1813, William Brunton of the Butterby Works, Derbyshire, constructed a steam locomotive in which he imitated with machinery the action of the hind legs of a horse. It worked something like the modern hay tedder, but without the kick. The machine was used for a few months and then blew up, killing and wounding several bystanders.

William Hedley, in the same year, with his "Puffing Billy," dragged eight or ten coal wagons at the rate of five miles an hour.

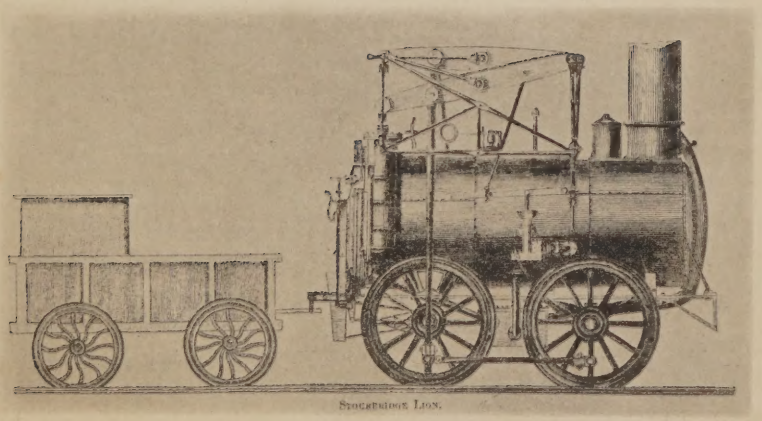
In the same year also a Mr. Blackett, by means of a platform car worked by a windlass, further tested the tractive power of a smooth wheel upon a smooth rail.

In the following year, 1814, George Stephenson, whose father was a fireman in a coal mine, completed and put in operation upon the Killingwood Railway a locomotive which drew eight loaded wagons of thirty tons weight at the rate of four miles an hour, on an ascending grade of one foot in four hundred and fifty.



WILLIAM BRUNTON LOCOMOTIVE.

BOSTON PUBLIC LIBRARY



STOCKTON'S LION.

OPENING OF THE FIRST ENGLISH RAILWAY BETWEEN STOCKTON AND DARLINGTON, SEPT. 27TH, 1825.

BOSTON PUBLIC LIBRARY

It was called the "Blucher." The escaping steam from the exhaust pipe frightened a horse upon the common road near the railroad. Mr. Stephenson was complained of and was warned by the police to abate the nuisance. To remedy the evil the device used by Trevithick of discharging the surplus steam into the smokestack was adopted by him, thereby improving the draft and causing the more rapid generation of steam. It does not appear whether this was an original idea of Stephenson's or whether he was aware of Trevithick's experiments.

On November 18, 1822, the railroad at the Hetton colliery was opened and five of Mr. Stephenson's locomotives were run upon it, each engine drawing after it seventeen loaded wagons, each train averaging sixty-four tons in weight and the speed being four miles an hour.

In August, 1823, Mr. Stephenson established locomotive works at Newcastle.

On the twenty-seventh of September, 1825, Mr. Stephenson, as chief engineer, opened the Stockton & Darlington Railway, another coal road, and his engine dragged a train consisting of six wagons loaded with coal and flour, a passenger coach, the first ever run upon a railroad, filled with directors and their friends, twenty-one wagons with temporary seats for passengers, and lastly six wagons loaded with coal, making a total of thirty-four wagons. A speed of twelve miles an hour was attained, and it is reported that at one time there were over six hundred passengers upon the train.

When the construction of the Manchester & Liverpool Railroad was in progress there was much dispute as to whether it should be operated by stationary or moving engines. Finally the directors decided in favor of the latter, and offered a prize of five hundred pounds sterling for a locomotive which should best fulfil certain requirements, the chief of which were that the engine must consume its own smoke, attain a speed of ten miles an hour with a pressure upon the boiler not exceeding fifty pounds, and if weighing six tons must be able to draw after it twenty tons, and if of less weight a proportionately smaller tonnage.

On the sixth of October, 1829, the competition took place and Mr. Stephenson on that day achieved a triumph which has placed his name on the list of the famous men of the world. His locomotive, the "Rocket," dragged a coach containing thirty passengers at the rate of twenty-six to thirty miles an hour. On the following day another trial was made and the "Rocket" dragged

thirteen tons backward and forward on the two miles of railroad, running thirty-five miles, including stoppages, in one hour and forty-eight minutes, the maximum speed being twenty-nine miles an hour. Three other engines competed. One of them, the "Novelty," succeeded in reaching the speed of twenty-four to twenty-eight miles an hour, but they all broke down in one way or another and the prize was awarded to the "Rocket."

The "Rocket," with coal and water, weighed four and one-half tons.

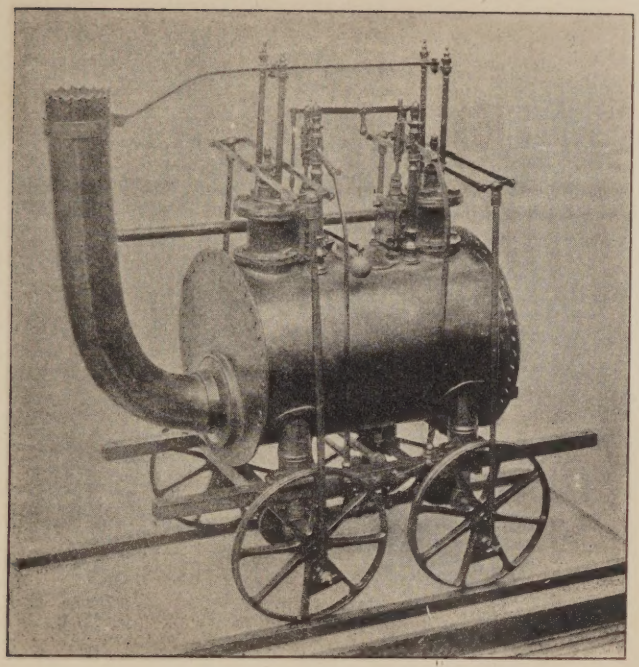
On the fifteenth of September, 1830, the Manchester & Liverpool Railroad was formally opened for passenger traffic. On this great occasion eight trains of cars, loaded with people, ran on two parallel tracks from Liverpool to Manchester and return, and attained a speed of fifteen miles an hour. The Duke of Wellington took part in this most important event. Mr. William Huskisson, an eminent member of Parliament, one of the most devoted friends of the enterprise, in the midst of the general rejoicings carelessly stood on the track while talking with the Duke of Wellington, was struck by the "Dart," and was so severely injured that he died upon the same day. It is said that after the accident Mr. Huskisson was carried a distance of seventeen miles in twenty-five minutes.

The superiority of the locomotive over the horse as a motive power on the railroad was no longer in doubt.

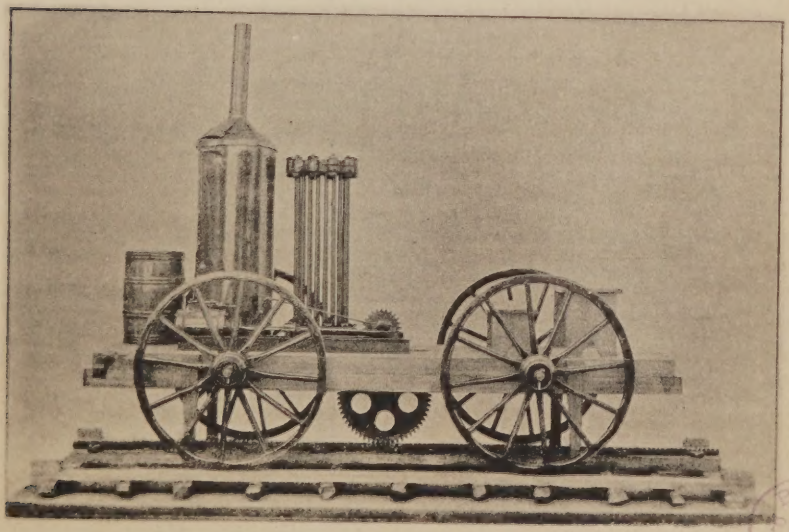
In 1825-1826 John Stevens built in Hoboken, New Jersey, a locomotive which was operated and carried passengers on a circular track with a rack-rail.

The first locomotive to be run in this country on a track without a rack-rail was the "Stourbridge Lion," so called because constructed in Stourbridge, England. It was imported from England by Mr. Horatio Allen for the Delaware & Hudson Canal Company, and was tried upon the railroad of that company at Honesdale in August, 1829. Mr. Allen, then twenty-seven years old, acted as both engineer and fireman, and to him alone belongs the distinction of having made this notable first trip which was indeed dangerous because the track was not built to carry so great a load as the Stourbridge Lion, which weighed seven tons.

To avoid the great strain of the engine upon the rails when rounding a curve, Mr. Allen in May, 1831, experimented with a swivelling four-wheel truck. Gridley Bryant, in 1826, at Quincy, to carry a heavy load had joined two four-wheel cars together by



STOCKTON AND DARLINGTON LOCOMOTIVE NO. 1, BUILT BY GEORGE STEPHENSON 1825. THE MODEL FROM WHICH THIS PICTURE WAS TAKEN WAS BROUGHT FROM ENGLAND TO AMERICA BY WM. STRICKLAND IN 1826 AND IS THE PROPERTY OF THE FRANKLIN INSTITUTE OF PHILA.

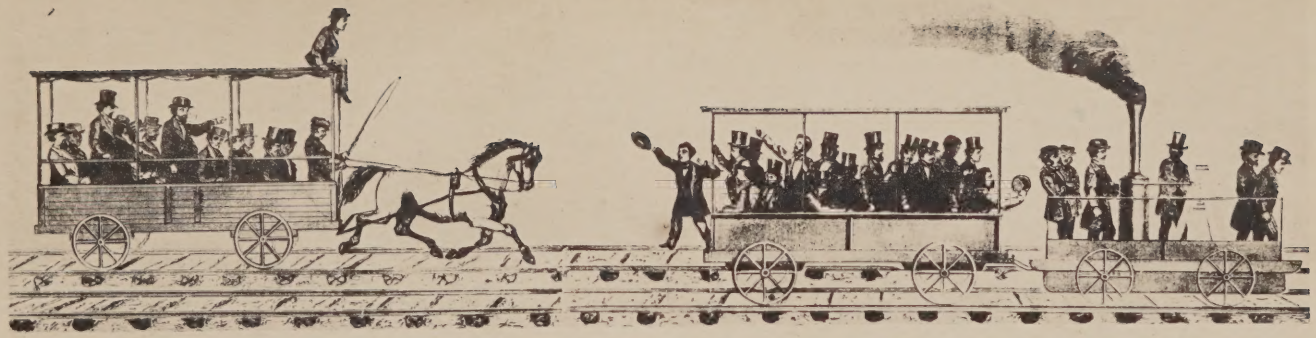


MODEL OF LOCOMOTIVE BUILT BY JOHN STEVENS AT HOBOKEN N. J. 1825. EXHIBITED BY PENN. R. R. CO., AT THE WORLDS COLUMBIAN EXPOSITION AT CHICAGO 1893.

BOSTON PUBLIC LIBRARY

SAILING CAR.

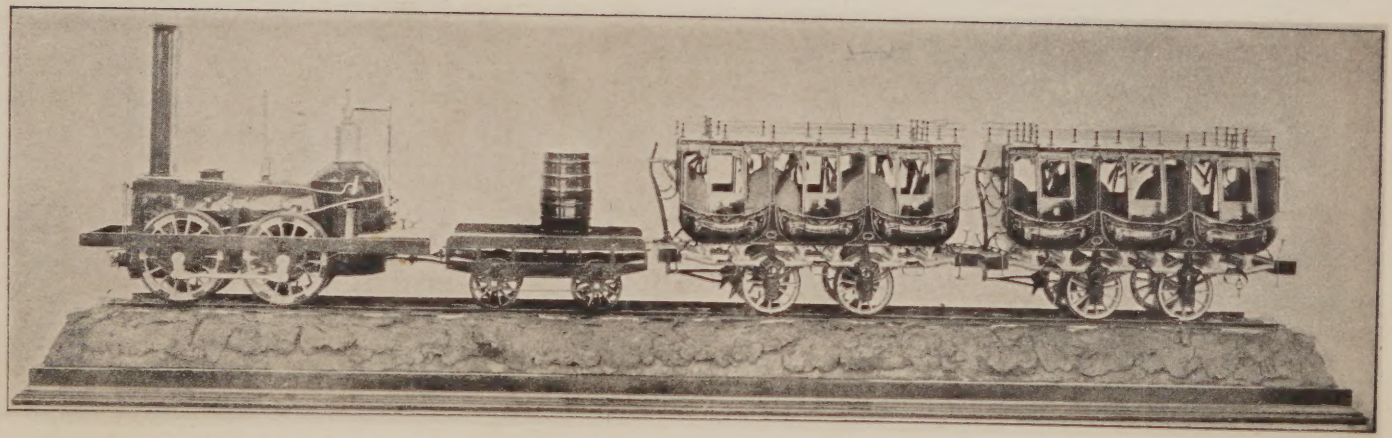
BOSTON PUBLIC



TRIAL OF SPEED BETWEEN COOPER'S LOCOMOTIVE AND HORSE CAR.

THE BEST FRIEND.

BOSTON PUBLIC

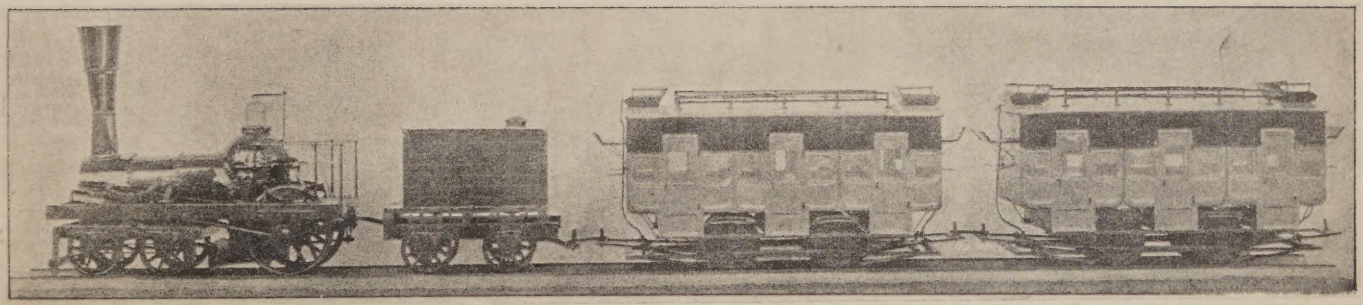


THE HELIOTYPE PRINTING CO., BOSTON.

MODEL OF LOCOMOTIVE JOHN BULL AND TRAIN.

THE FIRST TRAIN TO TO BE MOVED BY STEAM IN THE STATE OF NEW JERSEY, NOV. 12, 1831. THIS MODEL WAS MADE FROM THE ORIGINAL DRAWINGS FROM STEPHENSON'S SHOPS & WAS PART OF THE EXHIBIT OF THE PENN. R. R. CO., AT THE WORLDS COLUMBIAN EXPOSITION AT CHICAGO 1893.

PUBLIC LIBRARY



THE HELIOTYPE PRINTING CO., BOSTON.

LOCOMOTIVE LANCASTER AND TRAIN.

THIS LOCOMOTIVE WAS CONSTRUCTED BY MATTHIAS BALDWIN, PHILADELPHIA AND WAS THE FIRST TO BE PUT IN REGULAR SERVICE ON THE PENN. STATE ROAD 1834.

BOSTON PUBLIC LIBRARY

The "West Point," the Second Locomotive built in the United States for actual service on a Railroad.

THE FIRST LOCOMOTIVE AND TRAIN OF PASSENGER-CARS EVER RUN IN THE STATE OF NEW YORK.

The American Locomotive "De Witt Clinton," Mr. David Matthew, Engineer.

a platform with bolts. These were the beginnings of the now universally used bogie trucks which John D. Jervis and Ross Winans shortly after Mr. Allen's experiments put into successful use, the former on locomotives and the latter on cars.

The first locomotive built in the United States which was operated on a track without a rack-rail was constructed by Peter Cooper of New York at the St. Clair works, near Baltimore. It was named the "Tom Thumb," and was run upon the Baltimore & Ohio Railroad in the summer of 1829. It made its first passage from Baltimore to Ellicott's Mills, thirteen miles, over an average grade of eighteen feet to the mile, in one hour and twelve minutes, and the return trip was made in fifty-seven minutes. Coming back the engine had a race with a car drawn by a horse. The horse got the best of the start. The engine caught up with him and passed him, and then the band which worked the blower on the engine slipped off the drum, and before it could be replaced the race had been won by the horse.

The first locomotive built in the United States for actual service on a railroad was the "Best Friend," which was constructed for the South Carolina Railroad Company in the year 1830, and was put into regular service early in 1831. A year or so later a colored fireman fastened down the safety valve with the usual result. The second locomotive for actual service was the "West Point," which was also built for the South Carolina Railroad Company, and made an excursion trip with passengers on Saturday, March 5, 1831.

The third locomotive was the "DeWitt Clinton." These three locomotives were built at the West Point Foundry. The "DeWitt Clinton" was built for the Mohawk & Hudson Railroad Company, which was incorporated in 1826. In the early part of August, 1831, it made several trips between Albany and the brow of the hill at Schenectady, a distance of about twelve and a quarter miles. On some of these trips officials of the road and of the city and other dignitaries were passengers.

In Massachusetts the first trip of a train drawn on a railroad by a locomotive and carrying passengers, of which there were some forty or fifty, was made between Boston and Newton, on the Boston & Worcester Railroad, on the seventh of April, 1834.

On the fifteenth of the same month the *Daily Advertiser and Patriot* announced that the road would be opened for passengers on the following day, the sixteenth. The advertisement stated that the cars would start from the depot at 10 A. M. and 3.30

P. M. daily for Newton, returning at 11.15 A. M. and 4.45 P. M. The fare "for a seat to Newton" was 37½ cents, children half price.

The following is an extract from the records of the Boston & Providence Railroad Corporation, under date of June 4, 1834: "Railroad opened this morning for 10 miles from Boston, rate of travelling exceeding 23 miles an hour,—part of the distance nearly 30 miles an hour."

On Monday, June 30, 1834, the company advertised one tr each day with a locomotive engine to the Sprague Mansio House, a distance of ten miles, leaving Boston at 4 P. M., r turning from the Mansion House at half-past five and arriving at the depot in Boston at 6 P. M. Tickets for the round trip were 75 cents, and private cars holding twenty passengers, fifteen dollars.

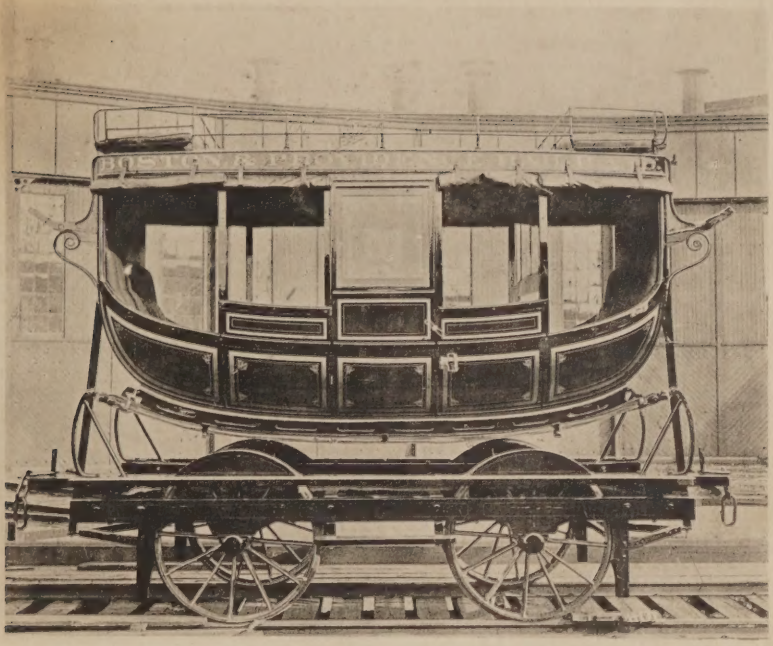
In August, 1834, a half mile of a single rail "suspension carriage road" was for a short time operated experimentally in East Boston. The car held twenty-four people and was drawn by a locomotive.

The picture of the Dublin & Kingston train is copied from the Dublin *Penny Post* of September 10, 1834.

THE RAILROAD OF TO-DAY.

Two-thirds of a century have passed since our steam railro d service took its first breath of life. The roadbed, the track, t wheels, the axles, the brakes, the car bodies and seats, t methods of heating, every minute detail of the construction cars, and all the wonderful mechanisms of the locomotive ha been improved and strengthened in thousands of ways by t enterprise and ingenuity of our engineers and mechanics, and t result is that wonderful creation, the railroad train of to-day, which, heated by steam and lighted by gas or electricity, the tra eller, with all the comforts of a parlor and a dining room by da and a bed to sleep in by night, journeys the whole length a breadth of this great continent with far greater safety than in t stagecoach of old, with ten times the speed and for less than on half the cost.

There are passenger locomotives now in use which, wi tender loaded, weigh over 250,000 pounds or more than twent five times as much as the Rocket did. There are freight loc motives which, with tender loaded, weigh over 400,000 pounc



ORIGINAL BOSTON & PROVIDENCE RAILROAD CAR.

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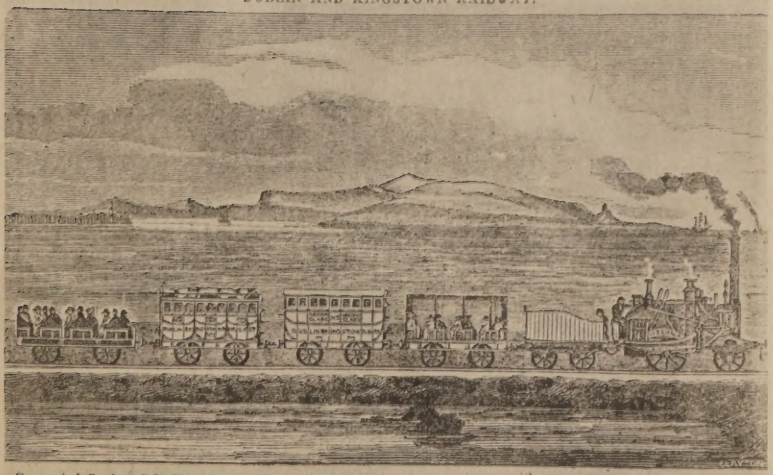
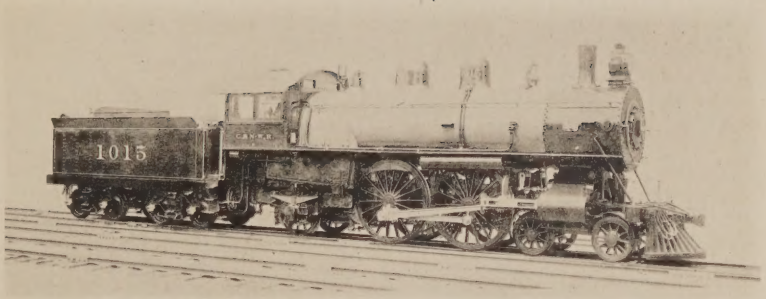
DUBLIN AND KINGSTOWN RAILWAY.



Geometrical Section of the First, Second, Third, and Fourth Class Carriages, with the Engine and Tender, passing Merrion, on their way to King-town.

Sept 10 1834



PASSENGER LOCOMOTIVE. WEIGHT 160000 LBS., WEIGHT WITH TENDER LOADED 255000 LBS.
DIAMETER OF DRIVERS 6 FT. 8 IN.

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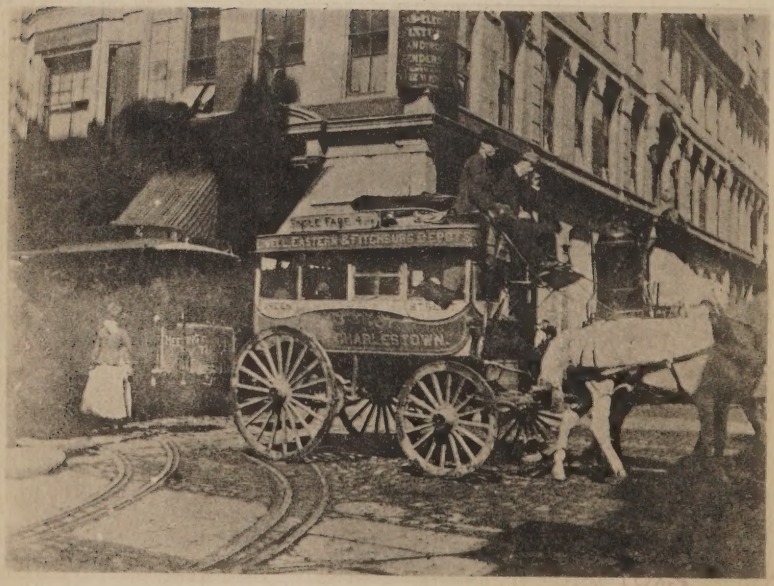
THE HELIOTYPE PRINTING CO., BOSTON.

THE HELIOTYPE PRINTING CO., BOSTON.

THE THIRD RAIL AND THE OVERHEAD ELECTRIC SYSTEMS AT NANTASKET JUNCTION, 1900.

BOSTON PUBLIC

THE OLD NORFOLK HOUSE.



THE BOSTON OMNIBUS.

The operation of the Nantasket Beach Railroad by the overhead electric system began in the summer of 1895. A combination of the third rail electric system between stations with the overhead system at the stations was put in operation on the South Shore line between Braintree and Nantasket Junction in the summer of 1897 and was soon afterwards extended to Cohasset. Up to the present time (1900) this section of the road is used both by trains with steam locomotives and by trains propelled by electric motors.

The substitution of electricity for steam gives relief from the serious discomfort caused by smoke, coal gas and cinders and renders possible a more adequate ventilation of cars. The vitiated air in various degrees of foulness which is encountered in trains and stations as well, winter and summer, day and night, is not simply disagreeable, it is positively injurious. The removal of this barrier to traffic, like all other great improvements, will result undoubtedly in a material increase of travel. This increase will be largest on suburban lines where the railroads, availing also of the additional advantage of the more frequent service which electricity renders possible, will get back from the street railways traffic which the latter attracted over to themselves by substituting electricity for horses.

In Massachusetts there are at the present time 2,000 miles of railroad line, with 4,000 miles of track, on which are carried each year 80,000,000 passengers an average distance of sixteen miles, and on which are also carried 36,000,000 tons of freight an average distance of eighty-eight miles.

But this is less than one-ninetieth of the total length of railroad lines in the United States, on which are now carried in a year about five hundred million passengers, each passenger travelling an average distance of twenty-seven miles, and on which also one thousand million tons of freight are carried an average distance of one hundred and thirty miles. To move this traffic 36,000 locomotives and 1,300,000 cars are required. These cars and locomotives, if placed end to end, would make a continuous line across the United States from the Atlantic to the Pacific and back again, and there would be enough left over to stretch another line from the Great Lakes to the Gulf of Mexico. The number of persons employed by the railroad companies of the United States is 825,000, and they receive for their services $450,000,000 annually. The amount of capital, stock and debt which has been issued to build up this immense system is eleven thousand millions of dollars.

The service of our railroads compares favorably with that rendered under similar conditions by railroads in England and Europe, whether operated by private corporations, as with us, or by the state. This is true not only in the matter of speed, safety, comfort and convenience, but it is also true of passenger and freight rates, notwithstanding wages, which constitute over one-half of operating expenses, are much higher in this country than elsewhere.

In Massachusetts the average freight rate per ton per mile is 1.18 cents. In the United States as a whole (Interstate Commerce Commission Report, 1898) it is 0.75 cent per mile. In Massachusetts the mileage ticket rate is 2 cents per mile and the average passenger fare for all classes of tickets is 1.77 cents per mile. In the United States (Interstate Commerce Commission Report, 1898) the average passenger fare is 1.97 cents per mile.

From the twenty-third annual report of the Board of Railroad Commissioners of Massachusetts, January, 1892, it appears that the passenger rates in Hungary and Austria subsequent to the adoption of the zone system in those countries were lower than those in England or the other European states. A comparative diagram given in that report shows that the average first and second class fares on express trains and the average first class fares on accommodation trains in Austria and the average for the same classes in Hungary up to 140 miles exceed 2 cents a mile. The fares which average less than 2 cents are for second and third class service on accommodation trains and third class service on express trains, all of which are inferior to the average service in Massachusetts. Both in Austria and Hungary a passenger having any baggage other than that which he can carry in his hand is obliged to pay extra for it.

The following table of average wages is also taken from the twenty-third annual report of the Board of Railroad Commissioners of Massachusetts:

OCCUPATION	UNITED STATES	NEW ENGLAND	GREAT BRITAIN	PRUSSIA	HUNGARY
Baggage-masters	$510 00	$557 00	—	$288 00	—
Conductors	824 00	883 00	$304 00	285 00	$324 00
Engineers	1,009 00	1,041 00	457 00	360 00	324 00
Firemen	562 00	592 00	285 00	252 00	—
Flagmen	354 00	390 00	254 00	169 20	—
Section Foremen	589 00	731 00	—	522 00	230 00
Switchmen	471 00	557 00	266 00	243 00	172 00
Telegraph operators	449 00	446 00	—	306 00	265 00

Steamboats, in the building of which John Fitch, Oliver Evans, John C. Stevens and Robert Fulton were pioneers, vastly increased the commercial value of the rivers, but rivers and canals were subject to floods in the spring and droughts in the summer, and in this vicinity were ice bound in the winter.

The railroad goes wherever it pleases. Like the river and the canal, it may follow the valleys, but it also crosses the rivers, crosses the valleys and crosses or pierces through the mountain ranges. It has opened up a new world and re-created the old. It has bound together and has been a potent agency in making strong, firm and enduring the union of these United States. It has been a necessary factor in creating our prosperity and our social and moral welfare. Not simply the well-being, but in many cases the very existence of large communities is dependent upon its service. It makes constantly for higher civilization. It is binding together the nations of the earth.

Our present ambassador to England, Hon. Joseph H. Choate, on his arrival at Southampton, in replying to an address of welcome, spoke of the steamships plying between England and America over the trackless ocean as weaving, like the shuttle, imperishable bonds between the two countries.

It is equally true that our railroads with their enduring tracks and with their service day by day and hour by hour, from town to town, from state to state, from country to country, north and south and east and west, are unceasingly weaving the fabric of civilization, ever enriching its texture and enlarging its bounds, and by promoting and extending mutuality of interests they are steadily making it more and more clear that the truest and most lasting prosperity is to be gained, not through hatred and war, but through friendship and peace.

What will be the motive power of the future? Will it be steam or compressed or liquified air, or will it be electricity,—electricity, the dread of the nations, death dealing and unknowable till the days of Franklin? By him it was guided, next it was studied and then developed, and now its terrible and destructive powers harnessed and in subjection surround us on all sides and are working day and night for the welfare of mankind. In obedience to a Morse, taking no heed of space, it transmits the signal of the telegraph. In obedience to a Bell and a Blake it takes its message of sound and forthwith reproduces that sound without possibility of mistake a thousand miles away. Under Roentgen it gives to the ray of light the power to pierce through tissues never

before illumined. It furnishes heat, it is superseding gas as an artificial light, and it is vying with steam as the great motive power of the world.

Whatever motive agency is finally triumphant we may be sure that in the coming century there will be progress in passenger transportation in these directions: more frequent service, better ventilated cars, less discomfort from dust and smoke, greater safety, greater speed and reduced passenger fares and freight rates.

BOSTON OMNIBUS ON RUNNERS.

BOSTON PUBLIC

THE BOSTON HORSE CAR.

LOCAL TRAFFIC.

THE HOURLY STAGE.

During the development of the railroad train and the steam locomotive there has been a corresponding development in short distance or local traffic in and around Boston.

In 1826 Brooks Bowman started an hourly stage between Boston and Roxbury, and in the same year Stephen Wiley established a similar line to Charlestown and Ebenezer Kimball a line to East Cambridge. Previous to this time the stage coaches on the various roads running out of Boston had been the only regular means of public conveyance by which a person could get from one part of the city to another or from the city to its immediate suburbs. Notice of the approach of the stage was given by the blowing of a post horn.

THE OMNIBUS.

In 1833 the first omnibus, the Governor Brooks, appeared in Boston. It had seats for eighteen passengers inside and six outside, and was drawn by four horses. Its route was from the Winnisimmet Ferry at the foot of Hanover Street to Roxbury, two hours and a half being allowed for the round trip. The fare was twelve and one-half cents. Subsequently a still larger, six-horse omnibus with seats for forty passengers was put in use. These large "busses," as they were called, proved to be unprofitable and were soon supplanted by smaller coaches drawn by two horses.

The well-known Dock Square and Canton Street line was started in 1846 by Messrs. Hobbs & Prescott. This line was in 1851 purchased by J. H. Hathorne, and thereafter was frequently called the Hathorne Line.

The following extract from the Pathfinder of 1849, the first year of its publication, indicates the extent of the omnibus traffic and the rates of fare in and around Boston fifty years ago:

Omnibusses in Boston and Vicinity.

Brighton—No 2 Montgomery place, 9, 10 AM, 1, 4, 6, 7 PM. For Boston 8, 9, 11½ AM, 2, 4½, 5½ PM. 25 cts.

Brookline—No. 2 Montgomery place, 9, 10, 11 AM, 1, 2, 4½, 6, 7 PM. For Boston 8.15, 9.15, 10 AM, 12 M, 1, 3, 5 and 7 PM. Fare 18¾ cts. or 8 tickets for $1.

Cambridgeport & Cambridge—43 & 19 Brattle st, every 15 min. 10 & 15 cts.

Cambridge Broadway Line—No 55 Court st, every hour from 8 AM to 8 PM. 10 cts, 12 tickets $1.

Charlestown—No 43 Brattle st, every 10 min. 10 cts.

Chelsea—City Hotel, Brattle st, 9, 11 AM, 3, 5, 7 PM. For Boston 8, 10 AM, 2, 4, 6 PM. 12½ cts.

Dorchester—No 10 Franklin st, 8, 9, 10, 11, 12 AM, 1, 2, 3, 4, 5, 6, 7, 8 PM. For Boston 6½, 7, 8, 9, 10, 11, 12 AM, 1, 2, 3, 4, 5, 6, 7 PM. 12½ cts.

Dover Street to Chelsea Ferry—Every half hour; 6¼.

Dover Street to Lowell Depot—Every half hour; 6¼

East Boston—58 Court st. 12½ cts. Every other hour.

East Cambridge—Office at City Hotel, Brattle st; every half hour. 10 cts, 16 tickets $1.

Fitchburg Railroad—State street. To connect with every train out, and in.

Grove Hall—No 10 Franklin st, 8, 9, 11 AM, 1, 2½, 5, 6, 7 PM. For Boston, 7, 8, 9, 11 AM, 1, 2, 3, 4, 5, 6 PM. 12½ cts.

Jamaica Plains—No 2 Montgomery place, 7½, 9, 10, 11, 12 AM, 1, 2½, 3½, 4½, 5¼, 6½, 7½, 9½ PM. For Boston 6¾, 7, 8½, 9½, 10½, 11½ AM, 1, 2, 3, 4, 5, 6½, 8 PM.

Malden—Brattle sqr, 12 M, 5 PM. For Boston 8 AM, 2 PM. 12½ cts.

Medford—Brattle sqr, 10½ AM and 4 PM. Sundays 9¼ AM, 7½ PM. For Boston 10½ AM, 4 PM. Sundays 8 AM. & 5½ PM. Fare 18¾ cts. Sundays 25.

Roxbury—(H. King's) cor Cornhill & Washington st, every 15 min. 10 cts. 16 tickets $1.

Roxbury, Mt Pleasant—Cor Cornhill & Washington st, every half hour. 10 cts, 16 tickets $1.

Roxbury—(Tremont road) cor Court & Tremont sts, every hour. 10 cts. 16 tickets $1.

South Boston, Mt Washington—Cornhill, every 15 min. 6¼ cts.

State Street to Lowell Depot—Every half hour; 6¼c

Washington Street Line—Dock sqr to Canton st, every 5 min. 6¼ cts. 2 tickets $1.

From the foregoing it appears that the single fare between Dock Square and Canton Street was six and one-quarter cents; from Boston to Roxbury or Charlestown, ten cents; to Dorchester, Grove Hall or Malden, twelve and one-half cents; to Cambridge, fifteen cents; to Brookline or Medford, eighteen and three-quarters cents; and to Brighton, twenty-five cents.

THE HORSE CAR.

It was just about the middle of the present century when the question of laying tracks in the streets of Boston began to be seriously agitated. The idea met with much opposition, but its advocates were successful in obtaining a charter in 1852 for the

Dorchester & Roxbury Railway, and in 1853 for the Metropolitan and the Cambridge Railway Companies. Three years later, on the twenty-sixth of March, 1856, the first Boston street car was run from Cambridgeport over the bridge to a point on Cambridge Street between Charles and West Cedar Streets.

In speaking of the opening of the new line and its importance, the *Evening Transcript* of the next day said:

"Cambridge Horse Railroad—Five trips were made over this road yesterday to the perfect satisfaction of a throng of passengers. It was demonstrated that two horses, hitched tandem, made the trip with a car containing forty passengers with more ease than they could have drawn an empty omnibus in the street. A special trial trip for the observation of a number of gentlemen was made early in the afternoon. The cars will commence running regularly next week, and the tracks will be completed the whole distance, between the Revere House and the Brattle House, during the month of April. This is the first horse railroad for passengers in New England, the first one in the United States being that between Schenectady and Saratoga Springs, which was built about twenty-three years ago."

The line was soon extended to Bowdoin Square in Boston and to Harvard Square in Cambridge.

In September of the same year (1856) a street car line between Roxbury and Boston was also put in operation.

For many years thereafter there was active competition between the omnibus and the street car. Each had its warm advocates and devoted patrons. In winter, when the first heavy snow came, the cars would be blockaded, while the omnibus on runners ran smoothly and merrily along with its jingling bells. Then the omnibus was triumphant. Later in the winter, when the snow was melting away, the tracks were clear and the cars would run smoothly and easily, while the omnibus sleigh, with four horses, was one moment bumping along through fearful cradle holes, which gave it a motion worse than that of a boat in a heavy chopped sea, and the next moment it was scratching along slowly and with fearful gratings over the bare pavement. Thus the contest between the two methods had many ups and downs, but the superiority of the street car in comfort and convenience secured year by year more general recognition. The street car, both for its passengers and for the public at large, was less noisy than the omnibus. It was broader and higher. It was better ventilated. It was easier to get in and out of. It carried more passengers and proved to be more profitable.

Street car lines were rapidly extended to all parts of the immediate suburbs of the city. One after another the omnibus lines succumbed, and after a life of about fifty years, the last half of which had been a struggle for existence, with fares reduced in some cases to three cents, the omnibus disappeared from Boston streets.

At the expiration of thirty years from its birth the street railway business had grown to such proportions in the heart of the city that the two main thoroughfares, Washington and Tremont Streets, at morning and at night were literally packed with cars, so that their very number rendered impossible the rapid transit which they were designed to secure.

THE ELECTRIC CAR.

On the second of July, 1888, the Lynn & Boston Railway Company made in the town of Revere the first successful use in this state of electricity as the motive power for a street car.

The West End Street Railway Company was the first to operate cars by electricity within the limits of the city of Boston. This was on the sixteenth of February, 1889. On the thirtieth of September of the same year that company had twenty-eight miles of its track equipped for and operated by this new motive power.

In the words of Oliver Wendell Holmes:

> "Since then on many a car you'll see
> A broomstick, plain as plain can be;
> On every stick there's a witch astride—
> The string, you see, to her leg is tied."

Under the enterprising and courageous leadership of Mr. Henry M. Whitney, its president, the West End Street Railway Company rapidly reconstructed and equipped its road for the overhead electric service.

This entailed a large expenditure, which to many seemed unwarranted and even reckless. It was necessary to provide huge electric power plants and an elaborate system of feed and return wires, to discard the old equipment and substitute an entirely new outfit of larger cars, provided with electric motors, and to reconstruct the tracks. The success of this much questioned experiment was, however, such that the other street railway companies were soon led to follow the example of the West End.

THE BOSTON ELECTRIC CAR.

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AN ELECTRIC AUTOMOBILE.

The capacity of the electric car per running foot of space occupied in the street was about sixty per cent greater than that of the horse car. The electric car, therefore, for the time gave relief to our streets, but the accommodations furnished by it were so much superior to those of the horse car that the volume of traffic increased more rapidly than before, and in a few years the congestion was worse than ever.

A remedy was absolutely necessary. The whole community was agitated as to the best method of relief. Some believed in widening streets, some in building new streets, some in building roads across the Common, some in elevated ways, and some in subways.

THE SUBWAY.

Under the provisions of an act passed in 1891, a commission to promote rapid transit in the city of Boston and suburbs was organized, Nathan Matthews, Jr., then mayor of the city, being its chairman. This commission in 1892 made an able and comprehensive report upon the whole question of transit as affecting the interests of the city. So far as the Tremont Street traffic was concerned it recommended in general terms that relief should be secured by the construction of a subway.

The Boston Transit Commission was created in 1894, with authority to build a subway to accommodate the Tremont Street traffic, if it deemed it expedient to do so. The commission, after a preliminary examination lasting for several months, reached the conclusion that to build a subway would be more effective than to widen the streets or to open new streets, less objectionable than an elevated road, and less expensive than either.

Work on the subway was begun on the twenty-eighth of March, 1895. A portion of the subway was opened for traffic September 1, 1897, and the remainder on Setpember 3, 1898. The chief engineer was Howard A. Carson.

The amount which the commission was authorized to expend was seven million dollars. The estimate of cost, made public in response to legislative inquiry before the work was commenced, was five million dollars. The actual cost was about eight hundred thousand dollars less than the estimate.

Before the subway was completed it was leased to the West End Street Railway Company for the term of twenty years, at a rental of four and seven-eighths per cent on the cost, whatever that cost should prove to be, provided it did not exceed seven

million dollars. This percentage was estimated to be sufficient to meet the interest on the debt incurred by the city for the construction of the subway and to make such further payment each year as would be necessary for a sinking fund adequate to pay the bonds at their maturity.

A distinguishing feature of the Boston subway is that it is lighted throughout by electricity. In a short section of it under Tremont Street, near the corner of Boylston, the two tracks being on different levels are in separate tunnels. The rest of the subway is built wide enough for two, three or four tracks, as the case may be.

The distance from the northern entrance to either of the southern entrances is about a mile and one-third, and the running time, which includes the time taken for five stops for cars going north and four stops for cars going south, is nine minutes.

DENSITY OF TRAFFIC IN SUBWAY.

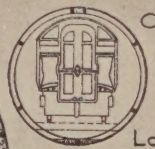
The Boston Elevated Railway and the Lynn & Boston Railway are the only companies running cars within the subway. They together operate in Boston and vicinity 446 miles of track, reckoned as single track, and carry in round numbers 220,000,000 passengers each year. There are five miles of track in the subway. The number of passengers carried in the subway for the year 1898 to 1899 was over 50,000,000. It appears, therefore, that while the trackage in the subway is but one eighty-ninth of the total operated by the two companies, it is actually used by more than one-fifth of all their passengers.

The traffic at the Park Street station is larger than at any other station within the subway. At this station there are two island platforms, one for traffic going north and the other for traffic going south. By the term island platform is meant a platform having a track on each side of it. These two platforms have together an area of fifteen thousand one hundred and ninety-seven square feet, or a little over one-third of an acre. In the first year after the subway was opened they were used by twenty-seven million four hundred thousand passengers. The traffic at the South Union Station in Boston is about twenty-two million and at the North Union Station about twenty-three million one hundred thousand.

The traffic at the Grand Central Station in New York is about fourteen million.

THE HELIOTYPE PRINTING CO., BOSTON.

THE BOSTON SUBWAY, NEAR THE PLEASANT STREET ENTRANCE SHOWING THE METHOD OF CONNECTION WITH THE TREMONT STREET AND THE SHAWMUT AVE. TRACKS WITHOUT A CROSSING AT GRADE.



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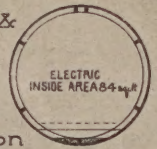

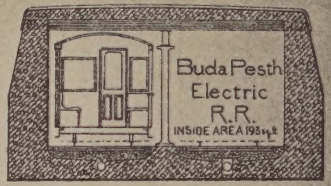

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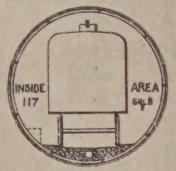
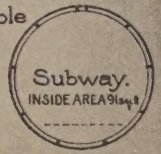
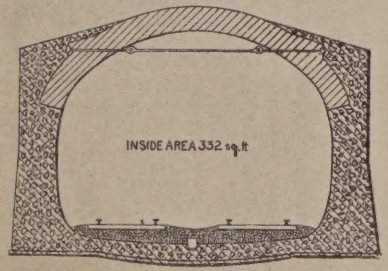
SCALE OF FEET



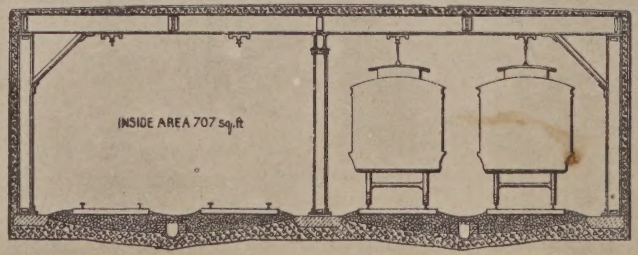
Short Tunnel begun
under River Spree
Berlin.

Cable

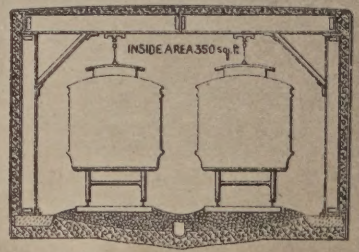




Subway Tremont St.



Boston 4 track Subway Tremont St. Mall.



Boylston St. Mall.

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LEASES AND CONSOLIDATIONS.

In 1886 there were seven independent street railway companies operating in the city of Boston and running their cars over each other's tracks. This condition of affairs promoted neither harmony, economy, nor the convenience of the public. The conflicting interests of these companies were in the next three years merged by leases and consolidations, so that the whole street railway system within the limits of the city has since been operated by two companies, namely, the West End Street Railway, or its lessee, the Boston Elevated Railway, and the Lynn & Boston Railway.

HORSE AND ELECTRIC CAR STATISTICS.

In 1889 the West End Street Railway and the Lynn & Boston Railway operated 292 miles of track, using 8,624 horses, and carrying a total of 114,623,468 passengers.

In 1899 the Boston Elevated Railway, the lessee of the West End, and the Lynn & Boston Railway together operated 446 miles of track, of which all but two and seventy-four one-hundredths miles were operated by electricity. They used for all purposes only 349 horses and carried 221,310,623 passengers.

The population of the metropolitan district which they serve is about one million.

The following comparative statement, giving statistics for the whole state, shows how rapidly and completely the change in motive power from horses to electricity has been brought about, and what results have followed:

	1888.	1898.
Track mileage of the street railway companies	561.82	1,644.66
Average capital invested per mile	$32,303.80	$44,958.08
Car mileage	23,244,767	68,206,418
Number of passengers carried	134,478,319	330,889,629
Number of passengers carried by the street railways in excess of those carried both within and without the state by the steam railroads reporting to Massachusetts Railroad Commission	44,791,907	228,948,907
Number of horses used	11,391	605
Number of employees	5,531	10,416

Average fares	5.1 cents	5.11 cents
Gross income	$6,860,504.32	$16,915,405.00
Net income	$1,096,852.79	$5,242,674.00
Percentage of expenses to earnings	84	69

In 1888 the 561 miles of track were operated by horses. In 1898 all but 7.5 miles out of the 1,644 miles of track were operated by electricity.

The population of the state is in round numbers two and one-half millions.

THE ELEVATED RAILWAY.

An elevated railway from Dudley Street, in Roxbury, to Sullivan Square, in Charlestown, is in process of construction by the Boston Elevated Railway Company. Its route from Dudley Street is over Washington Street to Castle Street, where it branches. The easterly branch goes by way of Harrison Avenue, Beach Street and Atlantic Avenue, while the tracks of the westerly branch, descending and passing under Pleasant Street, enter the subway. These tracks at the northern terminus of the subway again become elevated, and then the two lines, uniting on Causeway Street, pass as a two-track structure over the new Charlestown bridge.

The two-story street has become familiar. At the corner of Tremont and Boylston Streets the street is in three stories. It is not improbable that streets of several stories will become common in the near future.

THE AUTOMOBILE.

As has been stated, the railroad locomotive had its birth in efforts to construct a steam carriage for use upon the highway. These efforts were pushed with considerable vigor in England during the first third of the present century. In 1831 the question of the rates to be charged for steam carriages on toll roads in England had assumed such importance that a select committee of the House of Commons was appointed to take evidence and report upon the subject. The report of this committee was considered so valuable a document that in the following year it was printed in this country by order of the House of Representatives. (Doc. No. 101.)

It contains much interesting information in regard to the progress made by the steam carriage up to that date both in England and in the United States. The report concludes as follows:

"Sufficient evidence has been adduced to convince your committee:

"1. That carriages can be propelled by steam on common roads at an average rate of ten miles per hour.

"2. That at this rate they have conveyed upwards of fourteen passengers.

"3. That their weight, including engine, fuel, water and attendants, may be under three tons.

"4. That they can ascend and descend hills of considerable inclination with facility and safety.

"5. That they are perfectly safe for passengers.

"6. That they are not (or need not be, if properly constructed) nuisances to the public.

"7. That they will become a speedier and cheaper mode of conveyance than carriages drawn by horses.

"8. That as they admit of greater breadth of tire than other carriages, and as the roads are not acted on so injuriously as by the feet of horses in common draught, such carriages will cause less wear of roads than coaches drawn by horses.

"9. That rates of toll have been imposed on steam carriages, which would prohibit their being used on several lines of road, were such charges permitted to remain unaltered."

In England the steam carriage of those days was clumsy as well as heavy. Its use upon the highways, notwithstanding the foregoing report, met with much opposition. At first the speed was limited by special acts to two miles an hour within any city, town or village and to four miles an hour outside. By the General Locomotive Act of 1861 these limits were changed to five and ten miles per hour respectively. By the general act as well as by the various special acts three persons were required to be in attendance, one of them going ahead on foot and displaying a red flag. In 1898 an act was passed repealing the red-flag clause but requiring one of the three attendants to be ready at all times to assist any person in difficulty with a horse.

In the United States inventors met with similar difficulties. Under such circumstances for forty or fifty years but little advance in the construction of steam carriages was made. A few years ago interest in the subject was revived with vigor in France. Now, just at the close of the century, self-propelled vehicles of various types are being manufactured in large numbers in the United States as well as in France and England, and they have

become a common sight in our streets. The motive power used is either expansion, explosion or electricity. Electric storage battery four-wheeled hansom cabs so called, weighing about 4,200 pounds, were put in service in Boston as public carriages in 1899 and were soon followed by closed public cabs with seats for four persons and weighing about 4,500 pounds.

The re-establishment of omnibus lines, operated by electricity instead of horses, is under discussion in Boston and other large cities.

In the eighteenth century our ancestors used the horse without the carriage. In the nineteenth century we have had the horse with the carriage. In the twentieth century our descendants may have the carriage without the horse.

The railroads and street railways in Massachusetts rank among the best in the United States. Taking the state as a whole, it is probable that the needs and the convenience of all sections and all classes are better provided for here than anywhere else in the world. The superiority of the employees in character and intelligence contributes largely to the excellence of the service.

Seclusion means distrust, ignorance, stagnation. Intercourse leads to faith, knowledge, progress. The better the roads, the more perfect the means of transportation and the more general their use, the higher is the quality of the civilization. The nineteenth century development of the means of rapid transit has been unexampled. The progress of the century has been equally unexampled. That progress is the offspring of the steamboat and of improved roads, the steel rail and the locomotive. Nothing like it would have been possible without them.

Marvellous as has been the advance in transportation of this century we may, especially in view of the influence which our great technical schools are but just beginning to exert, look forward with the confident expectation that progress is not now to be stayed, but rather that it will be accelerated, and that the twentieth century will develop wonders as inconceivable by us of the present day as those with which we are now surrounded were inconceivable by men whose lot it was to live a hundred years ago.

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